

CLAIMS

1. Device for measuring muscle strength, characterized in that it comprises :

5 - a lower support base (1) adapted to support a standing patient (2) in plantar support on said lower support base (1),

- an upper support bracket (5) movable vertically above the lower support base (1) and conformed to bear vertically on the head (7) of said patient (2),

10 - means (11) for selectively immobilizing the upper bearing bracket (5) in vertical position,

- means (12) for measuring the vertical position of the upper support bracket (5),

15 - means (13) for measuring the vertical lifting force that the head (7) of the patient (2) applies to the upper support bracket (5),

20 - plantar support sensors (4a, 4b, 104a, 104b) in the lower support base (1) adapted to test for maintained normal plantar support of the foot or feet (3) of the patient (2) by producing a signal if the foot or feet (3) are no longer in normal plantar support.

25 2. Device according to claim 1, characterized in that the upper support bracket (5) is carried by a vertical column (10) connecting it to the lower support base (1).

30 3. Device according to either claim 1 or claim 2, characterized in that the lower support base (1) comprises plantar support sensors (4a, 4b, 104a, 104b) adapted to ensure that the bearing force is greater than a predefined minimum in both the anterior area (3b) and the posterior area (3a) of the foot (3).

35 4. Device according to any one of claims 1 to 3, characterized in that it further comprises an anterior support (14) adapted to constitute a frontal bearing against which the anterior base (15a) of the thigh (15)

of the patient (2) can bear on flexing by less than 30°, preferably less than 20°, with means (17) for measuring the forward muscular force to evaluate the frontal bearing force of the thigh (15) of the patient (2).

5           5. Device according to any one of claims 1 to 4, characterized in that it comprises a computation unit (18) associated with memory means (19) and display means (20) and receiving signals from the vertical position measuring means (12) and the plantar support sensors (4a,  
10   4b, 104a, 104b) of the lower bearing base (1), the memory means (19) containing a stored program for controlling the computation unit (18), the stored program including in particular a self-stretching amplitude measuring sequence for storing vertical positions of the upper  
15   support bracket (5) when the latter is allowed to slide freely and is pushed by the head (7) of the patient (2) and a self-stretching muscular force measuring sequence for storing values of the lifting force applied by the head (7) of the patient (2) to the upper support bracket  
20   (5) when said upper support bracket (5) is immobilized in an appropriate vertical position.

6. Device according to claim 5, characterized in that the stored program includes an endurance measurement sequence for measuring the time for which an appropriate  
25   lifting force applied by the head (7) of the patient (2) to the upper support bracket (5) is maintained.

7. Device according to claim 5 or claim 6, characterized in that the stored program includes sequences of instructions for testing in an intermittent contraction (TCI) mode by generating an intermittent  
30   signal detectable by the patient (2) to prompt alternate self-stretching contractions and relaxations and counting the number of contractions reaching a lifting force threshold after a sufficient relaxation characterized by  
35   a sufficiently low lifting force.

8. Method of measuring the muscular strength of a patient (2) using a device according to any one of claims 1 to 7, characterized in that it comprises the steps of :

- 5           a) placing the patient (2) in a standing position on the lower support base (1),
- b) ensuring continuously that the patient (2) is in normal plantar support on the lower bearing base (1), and interrupting the measurement if the plantar support
- 10          is not normal,
- c) measuring the amplitude of self-stretching of the patient (2) by allowing the upper support bracket (5) to slide up and down according to vertical movements of the head (7) of the patient (2) and storing successive
- 15          positions of the upper support bracket (5),
- d) determining the maximum self-stretching value corresponding to the highest position recorded during the previous step,
- e) fixing the vertical position of the upper
- 20          support bracket (5) a few millimeters below the maximum self-stretching value,
- f) measuring the self-stretching forces by storing the lifting force exerted by the head (7) of the patient (2) on the upper support bracket (5) when the
- 25          latter is immobilized vertically.

9. Method according to claim 8, characterized in that it further comprises the steps of :

- g) recording the maximum lifting force,
- h) selecting a lifting force threshold lower than
- 30          the maximum lifting force,
- i) determining the maximum endurance time (TME) by measuring the maximum time for which a lifting force greater than or equal to the lifting force threshold is maintained.

10. Method according to claim 8, characterized in that it further comprises the steps of :

g) storing the maximum lifting force,

h) selecting a lifting force threshold below the  
5 maximum lifting force,

j) in an intermittent contraction (TCI) mode, generating an intermittent signal detectable by the patient (2) to prompt alternate self-stretching contractions and relaxations and counting the number of  
10 contractions reaching a lifting force threshold after a sufficient relaxation characterized by a sufficiently low lifting force.

11. Method according to any one of claims 8 to 10, characterized in that it further comprises the steps  
15 of :

k) with the patient (2) in the position of the preceding steps for measuring the self-stretching force, in normal plantar support on one foot (3), measuring the maximum frontal force with which the thigh (15) of the  
20 patient (2) bears against the anterior support (14),

l) selecting a frontal bearing force threshold less than the maximum frontal bearing force exerted by the thigh (15),

m) determining the endurance of the psoas major  
25 muscle by measuring the maximum time for which a frontal bearing force greater than or equal to the frontal bearing force threshold is maintained and/or by counting the number of alternating contractions in periods of relaxation and reaching the frontal bearing force  
30 threshold.